

Wide Range Flow and Heat Flux Sensors for In-Flight Flow Characterization, Phase I

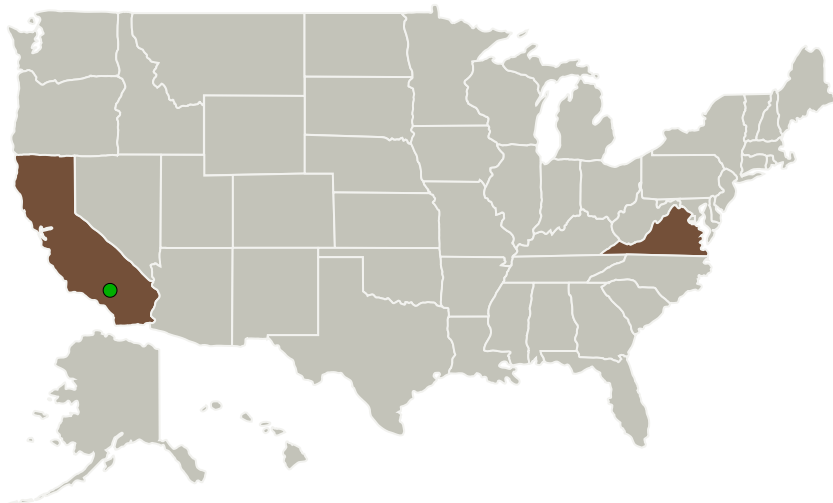
Completed Technology Project (2010 - 2011)



Project Introduction

The tracking of critical flow features (CFFs) such as stagnation point, flow separation, shock, and transition in flight provides insight into actual aircraft performance/safety. Sensing of these CFFs across flight regimes involves numerous challenges such as a wide temperature/pressure range from subsonic to hypersonic flows. Tao Systems, Mesoscribe Technologies and Virginia Tech propose to develop a novel direct-write sensor architecture for the in-flight measurement of skin friction and heat flux that is survivable to temperatures exceeding 1000 deg. C while simultaneously providing fast response necessary for real-time signal processing to obtain CFFs. As a consequence, this technology will extend the utility of CFFs for aeroservoelastic control from subsonic to supersonic and hypersonic flows, as well as provide test information from experiments in flight.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Tao of Systems Integration, Inc.	Lead Organization	Industry Minority-Owned Business, Small Disadvantaged Business (SDB)	Hampton, Virginia
● Armstrong Flight Research Center(AFRC)	Supporting Organization	NASA Center	Edwards, California
Virginia Polytechnic Institute and State University(VA Tech)	Supporting Organization	Academia	Blacksburg, Virginia

Primary U.S. Work Locations

California	Virginia
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Project Transitions

▶ **January 2010:** Project Start

✓ **January 2011:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/139555>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Tao of Systems Integration, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

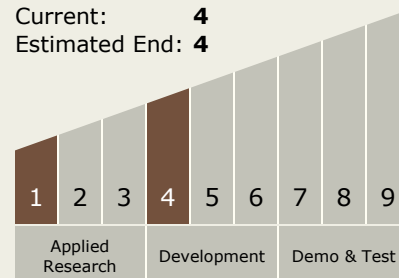
Carlos Torrez

Principal Investigator:

Arun Mangalam

Technology Maturity (TRL)

Start: **1**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX15 Flight Vehicle Systems
 - └ TX15.1 Aerosciences
 - └ TX15.1.1 Aerodynamics

Target Destinations

The Sun, Earth, The Moon,
Mars, Others Inside the Solar
System, Outside the Solar
System